

**World Heritage Biodiversity:
Filling Critical Gaps and Promoting Multi-Site Approaches to New Nominations of Tropical Coastal,
Marine and Small Island Ecosystems**

**POTENTIAL TROPICAL COASTAL, MARINE AND SMALL ISLAND WORLD HERITAGE SITES
IN THE MIDDLE EAST REGION**

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INTRODUCTION

Geographical Extent

The geographic area under consideration includes the Red Sea and its adjacent twin Gulfs of Suez and Aqaba, the Gulf of Aden, the Arabian Sea and the (Arabian / Persian) Gulf sub-regions. The term Gulf is now the commonly accepted name for the body of water previously known as the Arabian Gulf, Persian Gulf, Inner Gulf or ROPME Sea Area, and will be used henceforth.

The region extends from approximately 10°N; 32°E to 30°N; 65°E (Fig. 1), and encompasses various distinctly different marine and coastal habitats, containing complex and unique tropical marine ecosystems with high biological diversity and many endemic species. Within the region are found the world's largest loggerhead turtle (*Caretta caretta*) population, an isolated humpback whale (*Megaptera novaeangliae*) population, the Western Indian Ocean's largest hawksbill turtle (*Eretmochelys imbricata*) rookery, a unique, biogeographically isolated coral community, the world's second largest aggregations of endangered Dugong (*Dugong dugon*), large manta ray (*Manta birostris*) aggregations, and a host of other marine mega- and micro- fauna. The coastal habitats are surrounded by some of the driest land in the world, such that continental influences are limited, but the waters are major shipping lanes due to regional petroleum reserves, with high-risk bottlenecks at the narrow Straits of Hormuz, the Bab Al-Mandab, and the Gulf of Suez. While parts of the region are still in a pristine state, environmental threats (notably from habitat destruction, over-exploitation and pollution) are increasing rapidly, requiring immediate action to protect the region's coastal and marine environment.

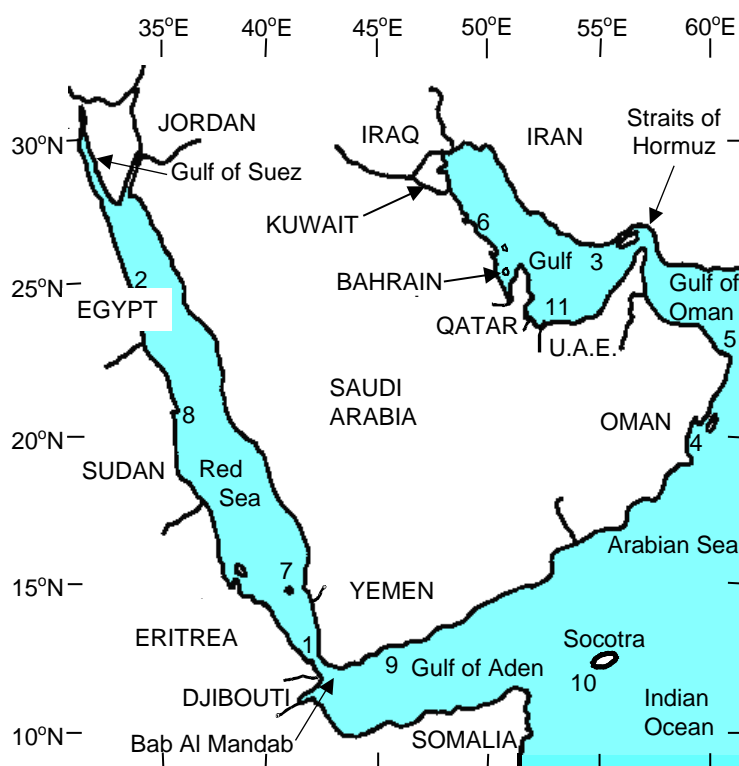


Fig. 1: Extent of the Middle East region under consideration for new World Heritage Site nominations of Tropical Coastal, Marine and Small Island Ecosystems (Numbers represent approximate proposed WHS locations).

Traditionally, the people of the region used to protect marine habitats and prohibited hunting during specific months of the year. They also developed types of protected areas, which were known as *Mahmiya* or *Himas*, even before the establishment of Islam. These protected areas were well established and managed, an early predecessor to today's concept of sustainable development. Two regional institutions oversee the status, management and conservation of the marine habitats in the region: The Regional Organisation for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA), including Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan, and Yemen; and the Regional Organisation for the Protection of the Marine Environment (ROPME), including Bahrain, Iran, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

Overview of the unique marine, coastal and small island ecosystems, habitats and species representative of biodiversity within the region

The region contains numerous sites that have been proposed for Protected Area status by their respective governments based on biological and physical characteristics. The following section describes the sub-regions and identifies those sites which contain unique biological assemblages and which are representative of the region.

Red Sea - The Red Sea is a semi-enclosed water body and a reservoir of marine biodiversity of global importance, home to the best developed coral reefs in the western Indian Ocean region. It is 1932 km long and 306 km wide at its widest part, and reaches a maximum depth of 2359 m. The Red Sea coast and islands support a variety of coastal and marine habitats, related largely to oceanographic regime, degree of exposure, and topographic features, particularly the distribution of suitable antecedent topography for development of coral reefs, mangrove stands and seagrass beds. In its relative isolation, an extraordinary range of ecosystems, biological diversity and endemism has developed, particularly among reef fishes and other organisms. The Red Sea is also special in that the entire water body is well mixed with almost-constant temperatures down to depths below 2000 m, resulting in unique deep water and deep sea fauna. There is an almost continuous fringing coral reef along the northern Red Sea and Gulf of Aqaba, which physically protects the shoreline. These reefs are the latest in a chronological sequence of raised (uplifted) and submerged reefs that have developed at various times over the past several hundred millennia. Reefs in the shallow Gulf of Suez are less well developed as this area is usually quite turbid and has extremes of temperature and salinity. Further south, the shelf becomes shallower and more sedimentary and the offshore pinnacles and islands become more important for reef development. The reefs are home to more than 250 species of hard (scleractinian) corals, the highest diversity in the Indian Ocean. Warm waters and lack of major fresh water runoff provide ideal conditions for coral reef formation along the coasts. Overall, these reefs are recognised as being some of the least impacted in the world. The Red Sea is also home to important mangrove stands, some at the northernmost limit of their geographical ranges, and supports extensive mudflat areas and other important coastal habitats. The Wejh bank, for example, supports dugong and turtle populations, extensive mudflat areas and seagrass beds, and is fringed on the seaward edge by a barrier reef formation.

Key environmental assets in the Red Sea include Dungonab Bay, Magarsam Island and offshore reefs, Sanganeb and the Suakin Archipelago in Sudan; the Southern Egyptian Red Sea (Ras Banas, etc., including offshore reefs, inshore reefs, coast, and the extremely interesting terrestrial / mountainous area, with unique fauna and flora); both sides of the Gulf of Aqaba, Ras Mohammed - Dahab, including St. Catherine's which has historical / biblical importance, and where the most successful MPA strategy is already in place (Ras Mohammed National Park), Giftun Islands and Straits of Gubal in Egypt; the Straits of Tiran; the Farasan archipelago; and the Wejh Bank in Saudi Arabia.

Gulf of Aden - The Gulf of Aden extends between the southern reaches of the Arabian peninsula and southward down the African coast from Djibouti to the easternmost tip of Somalia. It is influenced by seasonal upwellings that limit coral reef development and promote planktonic and macroalgae growth. Despite this, there are areas of biological importance, including seagrass meadows and mangrove stands, and diverse and complex reefs and non-reefal coral assemblages in the Gulf of Aden. Some of the sandy beaches are major nesting sites for sea turtles, and the Socotra archipelago has been considered for World Biosphere Reserve status. The coast of the Gulf of Aden supports only patchy reef distribution, but the Socotra archipelago is fringed by extensive reefs. Although many marine habitats in the Gulf of Aden region are still pristine and the threat of human impact low, threats are increasing rapidly and many areas are being damaged by coastal development and other human activities.

Key environmental assets in the Gulf of Aden include the Socotra archipelago, principally for terrestrial biodiversity but also for their unique marine communities / assemblages; Isles des Sept Frères / Ras Siyan and

both mainland shores of the Bab al Mandab (offering potential for trans-boundary conservation between Yemen and Djibouti); Bir Ali - Belhaf in Yemen (marine and terrestrial biodiversity, extremely important archaeological remains and the site of the remarkable mangrove crater, and Sikha Island); and Ras Imran - Khor Umeirah (important turtle feeding grounds); and the Aibat and Saad ad-Din Islands (Saba Wanak), also known as the Zeila area in Somalia for mangroves, corals, fish and terrestrial wildlife, also historically important as a very early Muslim settlement.

Arabian Sea - The Arabian Sea extends from the Gulf of Aden to Ras Al Hadd in Oman, and is subject to seasonal upwellings induced by the Indian Ocean monsoon system, which creates large temperature differences between seasons. This is reflected in the nature and distribution of marine communities. The southern coast off Dhofar (Oman) and parts of Yemen are unique in that they support a diverse and isolated macroalgae flora including the kelp plant *Ecklonia*, along with the endemic *Nizamuddinia*. The coastal areas and Masirah island support some of the world's greatest nesting assemblages of marine turtles, and unique whale and dolphin populations. In the Gulf of Oman and Arabian Sea the distribution of coral is limited to a few main areas. In most of these locations extensive coral communities and 'carpets' have developed, but at Barr Al Hickman the largest of these carpets is found. Both coral and reef fish diversity is higher in the Gulf of Oman and Arabian Sea than in the Gulf.

Key environmental assets in the Arabian Sea include the coastline of an existing World Heritage Site (Arabian Oryx Sanctuary), suspected breeding grounds of the humpback whale (Arabian population - these humpback whales are probably a genetically isolated population and as such may represent part of a separate NWIO stock) and other cetacean species, seagrasses, mangrove, coral reefs, mud flats, and sand banks (areas of very diverse and integrated set of habitats), important migratory bird feeding grounds, the unique monospecific reef south of Barr Al Hickman; the loggerhead, hawksbill, green turtle and olive ridley (*Lepidochelys olivacea*) nesting beaches in Masirah; the green turtle (*Chelonia mydas*) nesting beaches from Ra's Al Hadd south past Ra's Jinz; the northern parts of the Musandam Peninsula (a biogeographically important boundary area, with unique landscapes, fishing communities, and migratory routes into the Gulf); the Daymaniyat Islands on account of the birds, reefs and turtles; and the Hallaniyat Islands (formerly known as the Kuria Muria islands) and Dhofar coast at and to the north of Mirbat (including coastal hills), in the Sultanate of Oman (high endemism above and below the water and reknown history and culture, and diverse and spectacular terrestrial and marine landscapes).

The Gulf - The Gulf region extends from Shatt Al-Arab and the coastal lowlands in the north to the Strait of Hormuz and the high mountains of Oman in the south. It is a semi enclosed shallow continental water body measuring 1000 km in length and varying in width from a maximum of 340 to 60 km (at the Straits of Hormuz). The average depth is about 35 m and maximum is 100 m. The Gulf is subject to wide climatic fluctuations, with surface water temperatures generally ranging from 12 in the winter to > 35°C in the summer and salinity from 28-60 ppt. The narrow straits of Hormuz restrict water exchange with the Arabian Sea, causing the Gulf to become highly saline because of high evaporation and low inputs of fresh water. The Gulf is home to one of the world's largest dugong populations, found off the coasts of Saudi Arabia down to the United Arab Emirates, thought to number at least five thousand. It is also home to important green and hawksbill turtle nesting sites, off Iran and Saudi Arabia, extensive mangroves and important mudflats. Various ecosystems are present in the region: Terrestrial areas include *jebals* (mountains), coastal plains, *sabkhas* (semi-dry mud flats), natural fresh water springs, marshes and coastal mudflats. Marine ecosystems include mangrove swamps, seagrass beds, coral reefs and small offshore islands. Interestingly several corals are found living at the northernmost extremes of their ranges within the Gulf. These corals are more tolerant than elsewhere, and many withstand environmental extremes (seawater temperatures and salinity have some of the widest fluctuations recorded anywhere in the world) that would normally kill other corals. The biodiversity of reefs in the Gulf is relatively impoverished compared to the Indian Ocean, but the combination with mangrove habitats, extensive mudflats, seagrass beds and island habitats present some good examples of complex marine ecosystems. The Gulf contains some of the largest known oil fields in the world. Oil production and other activities have led to pollution input into the marine environment from well blow-outs, oil leakage from pipelines, loading terminals and discharges from refineries. Natural oil seepage is another source of pollution, estimated at about 10 % of the overall chronic oil discharges. Up to 35,000 tankers pass through the Straits of Hormuz annually, making the Gulf among the busiest tanker routes in the world.

Key environmental assets in the Gulf include the Sheedvar Island and Kharku Islands (nesting sites for marine turtles), and Nayband Bay in Iran (where the coral reefs of the Nayband Bay has been subjected to anthropogenic impacts due to proposed development for the PARS Special Energy Zone); the Murawah Island-Bu Tini Shoal region off the west coast of Abu Dhabi; and Al-jazeirah Al-Hamra in Ras Al-Khaimah; and the Jubail Marine Wildlife Sanctuary off the coast of Saudi Arabia.

Potential and Existing Threats to Biodiversity

Major threats in the region include landfilling and dredging for coastal expansion; destructive fishing methods; impacts from tourism, shipping and maritime activities, sewage and other pollution discharges; lack of public awareness, and insufficient implementation of legal instruments that affect marine conservation. Most threats are shared by all countries due to the enclosed nature of seas in the region, but are often more applicable or important to one country. Many are potential threats rather than existing ones (e.g. coastal development in Somalia is virtually at a standstill, compared to Saudi Arabia), but with political stability, growth of coastal settlement will increase and result in sediment runoff, sewage pollution, and landfilling. The major threats can be classified into several distinct categories:

Habitat Destruction - Extensive coastal development, including dredging and filling, is destroying large tracts of shallow marine habitats (particularly in the Gulf and major urban centers along the Red Sea). Additional habitat destruction takes place through commercial shipping and groundings, and from the recreational diving industry, through anchor and flipper damage. Urban, industrial and port development coupled with inadequate environmental planning, and little or no environmental assessment near developed areas is severe. Sedimentation is an invariable result of poorly construction, dredging and land reclamation (landfilling). There is a lack of management, awareness, and enforcement of regulations, which often results in physical damage to coral reefs through ignorance or willful neglect. Coastal development in Oman has caused the loss of important habitats in recent years, especially from road, port/harbour, hotel and heavy industry construction. Further plans threaten even greater areas.

Industrial Activities - The chronic release of industrial pollutants has reduced water quality in many parts of the region. This includes the discharge of untreated oily wastes from refineries, and sewage and phosphate ore washing are principal causes of nutrient enrichment in the Red Sea. Other polluting industries include power generation, desalination and fertilizer manufacturing.

Oil and other Hydrocarbons - Oil pollution comes from both production and transport; many millions of tonnes per annum pass through the region. There have been more than 20 oil spills along the Egyptian Red Sea since 1982, which have smothered and poisoned coastal ecosystems. Likewise there have been numerous oil spills that have affected the Gulf coastline, and parts of the Gulf of Aden and Gulf of Oman coasts. Chronic contamination is common from the oil terminals and tankers. Medium sized spills from ballast and bilge water discharges, and leakages from terminals cause localised damage and smother intertidal habitats. Few ports have reception facilities to collect oily wastes and the problem will continue mostly through a lack of enforcement of existing regulations. Throughout the region, there is inadequate control and monitoring of procedures, equipment and personnel and training. The potential exists for large oil spills and disasters from oil tank ruptures and collisions at sea, and in some areas, particularly the Red Sea, there are no mechanisms to contain or clean up oil spills. There have been at least three major hydrocarbon spills in the Gulf in the past two decades that have been coincident with mass marine mammal mortality. Other activities associated with hydrocarbon exploration / production also threaten marine life (e.g. seismic surveying).

Maritime Transport - Major shipping routes run past the coral reefs of the region e.g. about 16,000 ships pass through the Straits of Bab al-Mandab and Hormuz each year and 25,000 to 30,000 ships transit the Red Sea annually. The Arabian Gulf is a major oil tanker and commercial shipping area. Apart from ship-related pollution (e.g. discharges of garbage and oily wastes; bunkering activities) tanker accidents and discharges from unloading operations are serious current and future pollution risk. Added to this is physical damage to coral reefs by anchors and groundings; often the coral reefs are regarded as navigation hazards. Damage is particularly severe near major ports, where ships pass through narrow channels among large reef complexes (e.g. Straits of Tiran, Jeddah, Bab Al Mandab), and navigation markers are currently lacking. Vessel sewage and ship discharges of solid waste pose additional threats. There are poor navigational control systems, and a lack of suitable moorings throughout the region.

Fisheries - Shark resources are depleting rapidly and shark-fin catches by local fishermen show rapid declines, exacerbated by poaching by foreign vessels, particularly in the Gulf of Aden and Arabian Sea. Some of these fishermen operate with licences, but most fish illegally. The use of gillnets throughout the region damages coral reefs. Industrial fishing results in large bycatches that include turtles, dolphins and non-commercial fin-fish. There is a lack of surveillance and enforcement of existing regulations, such as the unregulated use of spearguns in MPAs. Over-fishing of reef species is evident in several areas, and this may also be having secondary effects by removing predators (families Lethrinidae, Balistidae and Tetradontidae) thereby catalysing outbreaks of the crown-of-thorns starfish that are a serious problem in the region. Artisanal fisheries use illegal gears (e.g.

monofilament nets, spearguns) that damage the resource and its supporting habitats. Damage to reefs by discarded or lost fishing nets is a major threat. These nets, and especially 'active' nets, are also a very significant threat to marine megafauna, particularly marine turtles and cetaceans.

Recreational Activities - Some damage is observed around major tourist dive sites as anchor, trampling and flipper damage to fragile corals, particularly in the Red Sea. This is particularly evident around the major tourist sites in Egypt at Ras Mohammed and Hurghada, in Sudan at Sanganeb and at Sept Freres and Moucha and Maskalia in Djibouti, where it is estimated that there are thousands of tourist divers each year. Vast amounts of corals, molluscs and fish are also collected for the curio and aquarium trades in Egypt, and was widespread in Saudi Arabia in the 70s and 80s, although this is somewhat curtailed today. Recreation driving on beaches is also a major threat to coastal habitats, particularly in Oman, Saudi Arabia and in the U.A.E.

Domestic Sewage Pollution - Most sewage in the region is discharged untreated or partially treated into nearshore waters and often directly into sensitive marine habitats off major urban areas. There virtually no sewage treatment plants in the region, existing plants require regular maintenance, and damage is occurring to coastal habitats because there are inadequate pollution control regulations, monitoring and enforcement. Algal blooms have been reported as a result of sewage discharges. There are substantial amounts of solid wastes, especially plastics, which are dumped into the sea from urban areas and shipping, and this is particularly severe near the major shipping lanes that pass through the Suez Canal, the Straits of Bab al Mandab and Hormuz, and major ports.

Natural Predators - There have been recent major outbreaks of the crown-of-thorns starfish (*Acanthaster planci*) and sea urchins (*Diadema* sp.) in most countries. Gastropod snails (*Coralliphylia* sp. and *Drupella*) were found actively feeding on *Porites* sp. at several sites. In Egypt in 1998, the greatest outbreak of *A. planci* (10,000 individuals) occurred around Gordon reef near Tiran, island which continues to this day, and large numbers were also found at Khor Ambado in Djibouti. The urchins *Echinometra* and *Diadema* spp. occur in moderate to high abundance (>10m²) at some reef sites, and are major contributors to bio-erosion along with grazing parrot fishes (Scaridae) and boring sponges. On land camels and other wildlife graze on mangroves and salt marsh vegetation.

Coral Bleaching - There has been extensive recent coral mortality on many reefs, including those in the Saudi Arabian portion of the Gulf, the northern nearshore area of the Red Sea, in the southern Red Sea, the Socotra archipelago and north east Gulf of Aden. A number of Red Sea sites that had healthy coral cover in the 1980s, experienced near total mortality.

Coral Disease - These are apparently becoming more prevalent in the Red Sea, and include black-band and white-band disease, which may result from cumulative anthropogenic stresses such as high nutrient and sediment loads.

Desalination - There is extensive use of desalinated water to meet demands of the population and industry. There are at least 18 desalination plants operating along the Red Sea coast and many more in the Gulf which discharge hot brine and maintenance chemicals (chlorine and anti-scalants) directly near coral reefs. Power stations at also discharge saline high-temperature water that result in temperature increase in surrounding waters causing localised coral bleaching and mortality.

POTENTIAL WORLD HERITAGE SITE NOMINATIONS

The following are presented in alphabetical order by country, in no particular priority sequence. They represent ten of the most suitable and important coastal, marine and small island sites in the Middle East for conservation at a global level, and offer a number of trans-boundary and regional Protected Area Network opportunities.

1. Sept Frères Islands / Ras Siyyan and the Bab al Mandab, Djibouti - Yemen

The Sawabi (Sept Frères) archipelago (~12°28'N; 43°28'E) east of Ras Siyyan is a group of high aspect, rocky islands and an adjacent coastal stretch with a mangrove-fringed bay, containing diverse coral reefs and rich reef-associated fish and invertebrate fauna. Lying at the junction of the Red Sea and the Gulf of Aden, this area is abundant nesting seabirds, and the area serves as an important migratory route into and out of the Red Sea. The adjacent mainland, on both sides of the strait of Bab al Mandab, is the location of important coral and mangrove communities. This entire area, lying between the Red Sea and the very different Gulf of Aden, is the location of unusual and regionally exceptionally diverse marine communities. These include a shark nursery inside Ras Siyyan Bay on the Djibouti side, and some exceptional coral, mangrove and seagrass areas on the Yemen side. This proposed WH site should ideally extend for 30 – 60 km along each mainland shore, taking in these areas.

There is pressure from recreational activities, fishing, and siltation caused by passing vessels. At present there is no Protected Area status, but PERSGA has nominated this as one of its key regional MPAs within its Strategic Action Plan currently being funded through a GEF facility.

A number of institutions in Djibouti are involved with coastal and marine area and resource management. These are the Ministry of Agriculture and Hydraulic through the Directorate of Stock-farming and Fisheries; the Ministry of Transport and Telecommunications through its Directorate of Maritime Affairs; the National Office for Tourism, Arts and Crafts; the Presidency of the Republic, through the Institute of Higher Studies, Scientific and Technical Research; the Service for Management and Environment, the Inter-ministerial Co-ordination Commission on the Protection of the Marine Fauna and the Seabed and the National Council of the Sea. Nomination and designation as a WHS would be hampered by funding constraints, and would need an international accord with Yemen. For details on Yemen's coastal resource management, see proposed Site # 10.

The important shark nursery, diverse coastal and benthic habitats and the role they play in maintaining marine faunal assemblages in the southern Red Sea (which are biogeographically unique) provide a suitable justification for WHS status. The proposed site would encompass > 5,000 km², allowing ample buffering capacity to withstand short-term natural or anthropogenic impacts.

2. Gabal Elba Conservation Area, Egypt

Gabal Elba is located along the southern portion of the Egyptian Red Sea. The Elba protectorate is by far the largest in Egypt, encompassing some 30,000 sq. km of the Doaib, Gebel Elba and Abraha regions (~22°10'N 36°19'E). The protectorate supports large mangrove communities which serve as important bird breeding sites, and extensive fringing reefs along the mainland and offshore islands. The main threats within the MPA are extensive fishing activities. The terrestrial part contains mountains and gently sloping plains, while the marine component comprises 22 offshore islands of the Siyal and Rawabel groups, extensive fringing reefs, mangroves, seagrass, fish and marine mammals. The area is currently being addressed through GEF-Egypt and USAID projects, and is one of the key regional MPAs that PERSGA has nominated within its Strategic Action Plan currently being funded through a GEF facility.

There are several institutions that carry out monitoring activities along the Egyptian environment, and there are three national institutions tasked with the management of marine resources: the Tourism Development Agency, the Egyptian Environmental Affairs Agency and the three Red Sea Governorates. The Egyptian Environmental Affairs Agency (EEAA) is responsible for monitoring pollution and damage of coastal environments. The National Institute of Oceanography and Fisheries (NIOF) has carried out investigations of fisheries and corals and associated fauna in the Hurghada region for 70 years. In addition staff from the Al-Azhar University, Suez Canal University carry out research and monitoring of coral reef habitats. Finally, there are several secondary agencies which play a role in environmental management: The Egyptian General Petroleum Corporation (EGPC), which controls the activities of international oil companies and has developed an oil spill response capability in Ras Ghareb on the Gulf of Suez; and the National Committee for Integrated Coastal Zone Management (NCICZM), which co-ordinates coastal activities among competent authorities by developing guidelines for all activities, including EIAs.

The proposed area's diverse and extensive coral reefs offer a substantial capacity to maintain regional biodiversity levels in the region through larval dispersion processes, in addition to being a reservoir of diverse marine flora and fauna itself. A potential benefit to being accorded WHS status would be its remoteness and low population levels, while some constraints might be faced by the continuing conflicts between the Egyptian and Sudanese governments regarding the exact international border delineation. However, its nomination (or at least consideration) could possibly be an avenue for discussions toward a peaceful settlement of this issue.

3. Haraa Protected Area, Iran

The area lies in the straits of Khuran, between Qeshm Island and the southern Iranian coast, Hormozgan Province (26°45' N; 55°40' E), and includes the Mehran delta which forms extensive intertidal flats and has a marshy coastline and vast mangrove formation. There are numerous small islands, creeks and minor estuaries. The climate is subtropical and summers are extremely hot with temperatures reaching 45° C. Rainfall is low with an annual total of 100-300 mm, mainly falling from November to April. The Reserve contains the largest stand of *Avicennia marina* mangroves along the Gulf shoreline. This area is of major importance to breeding, wintering and migrant water birds. Many herons breed, including great white egret (*Egretta alba*) western reef heron (*E. gularis*), Indian Pond heron (*Ardeola grayii*) and goliath heron (*Ardea goliath*). Migrant birds include grey heron (*Ardea cinerea*) red shank (*Tringa totanus*), terek sand piper (*T. cinereus*) bar tailed godwit (*Limosa lapponica*) and curlew (*Numenius arquata*). Flocks of dalmatian pelican (*Pelecanus crispus*), spoonbill (*Platalea leucorodia*) and greater flamingo (*Phoenicopterus ruber*) spend the winter here. More than 93 species of birds have been recorded in the Reserve. Other vertebrates of the Area include fish (32 species from 17 families); reptiles: marine turtles include *Eretmochelys imbricata* and *Chelonia mydas* and five species of marine snakes; mammals include foxes, jackals and hyenas. There is one species of rodent (*Rattus rattus*) which has adapted itself to Haraa forests. Invertebrates include molluscs (16 species from 13 families of gastropods and 15 species from 9 families of bivalves); crustaceans (10 species from 3 families of lobsters). It is suspected that the finless porpoise (*Neophocaena phocaenoides*), which is extremely rare in the region (only 30-40 individuals) still occurs at this location.

Some illegal cutting and logging of mangrove by adjacent local population for fuel (charcoal) and grazing by domestic livestock has been reported. A part of the area is potentially at risk from the existing and future Development Plan on Qeshm. There is also some disturbance in the straits from fishing and boat traffic. While mangrove cutting for making charcoal has been mostly controlled, and a simple zoning plan has been prepared in recent years, management activities are still poor.

The main area of mangroves and mudflats (an area of 82360 ha) was designated as Protected Area in 1972. This Reserve was later increased in size to 85686 ha in 1975 and upgraded to National Park status (Hara N. P.). However, the park was downgraded to Protected Area in the 1980's. The entire area of mangroves, mudflats and creeks in the Khouran straits (100,000 ha) was designated as a Ramsar site on 23 June 1975. The entire Reserve (85686 ha) was designated as a Biosphere Reserve in 1976. The purpose of the conservation is to protect the area as a typical representative of the Paleotropical feature of Iran, and to protect monospecific stands of Haraa or white mangrove, which reaches to most north western limits of its distribution in this region, as well as having an outstanding landscape and scenic wonders.

The considerable size of the area at this unique geographical and geopolitical location offers and outstanding opportunity to provide long-term protection to important marine faunal and floral assemblages, and is known to be part of a migratory route for marine turtles, and probably most of the charismatic marine megafauna through the Straits of Hormuz. Given historic claims on various islands in this narrow stretch of water between Iran and the United Arab Emirates there is a potential for conflict should a greater region be nominated which extends across to Oman's Musandam peninsula and the Ras al Khaimah emirate of the UAE.

4. Masirah Island and Barr Al Hickman, Oman

Masirah Island and Barr Al Hickman are currently being considered for protection under the Man and the Biosphere initiative administered by UNESCO. Masirah Island is a barren rocky island located approximately 8 km from the southeastern coast of Oman in the Indian Ocean (20°30'N; 59°00'E), which supports the largest loggerhead turtle nesting grounds in the world, and the only significant nesting site in the region (> 30,000 females per annum). The island is 70 km long and 4-10 km wide. It supports a population of approximately 10,000 people, all of whom live in the northern half of the island. Between Masirah Island and Barr Al Hickman on the mainland there is a shallow sandy channel which is an important feeding ground for the green turtle. The channel is approximately 80 km long with a maximum depth of 10 m and a total area of about 800 sq. km. It supports seagrasses, which is the main staple of the green turtle. On the eastern side of the island more oceanic conditions prevail, with deep water close offshore. The dominant climatic influence is the SW monsoon which blows from May to September, causing an upwelling of nutrient-rich water along the Omani coast. Hawksbills, turtles nest on the southern tip of the island at Omedu, with a major nesting aggregation of loggerheads and some olive ridley turtles. Loggerheads also nest in large numbers elsewhere on the island.

There may be as many as 22 species of whales and dolphins that inhabit or pass through the area encompassed by the island and its surrounding waters. In some areas, it is possible to regularly encounter hundreds of spinner dolphins mixed with schools of common dolphins. These include Risso's dolphins, false killer whales,

Bottlenose and Indo-Pacific humpback dolphins, humpback whales, Bryde's, minke and sperm whales, spotted dolphins, killer whales, pygmy killer whales, blue and fin whales, and even dwarf sperm whales of the shy Cuvier's beaked whale. Relatively little is known about any of the whales and dolphins around Oman, or for that matter the whole of Arabia. Recent sightings have even suggested the possibility of two species (or at least a sub-species) new to science, making the area around Masirah Island that much more important with regard to cetacean diversity. The region also supports an extensive monospecific *Montipora* reef, as well as flocks of migratory birds (mainly at Barr Al Hickman on the mainland opposite Masirah). Both from an ecological as well as socio-political perspective, it would make sense to include both areas in a single WHS. Thus, Masirah Island and eastwards to include southern Barr Al Hikman, and from there the coast southwards to Ras Madrakah should be included in a WHS. There is some human activity in the region (fishing mainly) and a few small villages along one stretch of the coast described above, but overall this is a phenomenal area, relatively pristine, of great scientific interest and very high conservation value.

The United Nations Environmental Programme (UNEP) cited the Sultanate as a country with one of the best records in environmental conservation and pollution control measures geared to protect the land, air and water, and maintain the ecological balance. Firm action on the part of the Government under the personal guidance of HM the Sultan has saved Oman from environmental disasters that have occurred in some other developing countries. In 1979 the Council for Conservation of the Environment and Prevention of Pollution was established. A further step was taken in 1984 with the establishment of the Ministry of the Environment. In October 1990 a seven-year coastal zone management project was completed in response to the threat posed by rapid urban development. Strict laws now exist in Oman for wild life protection, and the hunting or shooting of wild life is banned. These laws and regulations are, for the most part, strictly enforced. Oman has also recently developed a national biodiversity strategy and action plan as part of its commitment to the Convention on Biological Diversity. Given these circumstances, it is likely Oman would be a successful country in which further WHS nominations would be effective.

5. Ras Al Hadd, Oman

Ras Al Hadd is the easternmost point of the Arabian peninsula and the dividing line between the Indian Ocean and the Gulf of Oman. The area comprises many turtle nesting beaches, one of which is accessible to visitors, but there are still unresolved conflicts between turtle conservation and local fishing interests. The area is one of the busiest nesting sites in the world, with up to 20,000 green turtles per annum, making it the most important green turtle rookery in the Indian Ocean. Given the logistical difficulties in protecting marine turtles at sea, the protection of these nesting beaches will offer the best chance of *in-situ* conservation. South of Ras Al Hadd the Arabian shoreline borders the great Wahiba Sands desert, where sand dunes reach the coast. In addition, the spectacular cliffs within the area are exceptional in their aesthetic value, a stark contrast to the blue ocean beyond.

A Royal Decree established Ras Al Hadd as a Nature Reserve in 1996 covering 50 km of coastline in an extended area around the headland. The Ras Al Hadd National Scenic Reserve (NSR) encompasses an area of 80 km², including some shallow coastal marine habitats. The northern and western parts of the reserve cover mostly rugged limestone hills that are dissected by wadis and end as low sea cliffs. There are two large khawrs (creeks) within the boundaries: khawr Jaramah and khawr Al-Hajar, both of which are feeding grounds for green turtles for part of the year. Under the same principles as the Masirah Island nomination, the efficient government address of environmental issues and the standing history of successful conservation practices, it is likely that the Ras Al Hadd site would be a successful WHS.

This is a relatively small site, home to a regionally, if not globally, important green turtle population. It might be possible to extend a conservation area across the Gulf of Oman to Pakistani beaches, though the expanse of open water in between might make this unrealistic. Regardless, the importance of Ras al Hadd as a green turtle rookery which is known to have migratory links that extend to Socotra, Yemen, Eritrea, Somalia and Djibouti should not be discounted.

6. Jubail Marine Wildlife Sanctuary, Saudi Arabia

The Jubail Marine Wildlife Sanctuary was established off the coast of Saudi Arabia in the Arabian Gulf. The area encompasses extensive mudflats, mangroves, and a diverse array of benthic habitats including reefs and seagrasses. There are reefs which mostly appear as small pinnacles or outcrops, and as patch reefs between Ras Al-Mishab Saffaniyah and Abu Ali, and between Abu Ali and Ras Tanura, and as fringing reefs around the offshore islands. These reefs support coral growth at their extreme northern distribution, and which are remarkable in that they withstand the major shifts in temperature and salinity which occur in the Gulf. The area is also an important avifaunal wintering site and migratory pathway, with extensive shallow water bodies. The

endangered Socotra cormorant is a migrant through the Sanctuary, which also is home to breeding populations of hundreds of thousand of terns (*Sterna* spp.). The offshore islands are home to the Gulf's largest nesting populations of marine turtles, and possibly the largest hawksbill rookery in the NWIO. Five species of whales, dolphins and porpoises have been identified in the Sanctuary, and a detailed biological inventory has been carried out, spanning several years.

This is a *de facto* protected area awaiting Royal declaration. Established in 1994 and covering an area of 2300 sq. km, research and baseline surveys to identify the main ecosystems were carried out after the Gulf war. There are no NGOs operating in Saudi Arabia that would be able to address the issue of site nomination / long-term commitments for a WHS, but it is likely this will be addressed by the National Commission for Wildlife Conservation and Development (NCWCD), in consultation with the Meteorological and Environmental Protection Administration (MEPA).

Although lying entirely within Saudi Arabian waters, the Jubail Wildlife Sanctuary has great regional importance as the largest green turtle and hawksbill turtle rookery on either coastline of the Gulf, from which turtles migrate to Iran and the United Arab Emirates and even out of the Straits of Hormuz to Oman. Similarly, being the home to great nesting populations of terns on the islands and a migratory stopover point for wintering waders makes the proposed WHS a key link in maintaining regionally and globally important populations.

7. Farasan Inner and Outer Banks (Archipelago), Saudi Arabia

The Inner Bank comprise a low-lying, seasonally inundated mainland coastline, fringing mangroves, islands, birds nesting and dugong area. The Farasan Outer Bank or Archipelago is located in the Red Sea off Saudi Arabia and Yemen between 3 to 100 km offshore, and the proposed protected area encompasses 3310 sq. km. It is composed principally of uplifted coral reefs, limestone and aeolian deposits, and is rich in coastal and marine resources. It contains a diverse range of habitats, including coral and algal reefs, intertidal flats and seagrass beds. These support a wide diversity of fishes, and are home to marine turtles, dugong, and numerous resident and migratory bird species. There are also four species of cetaceans, the Indo-Pacific, Spinner and Bottlenose dolphin, and the Bryde's whale. The Farasan Islands and Farasan Bank support a wide variety of reef types, including 'tower' reefs and other marine and coastal habitats not present in other areas. The Farasan islands also contain then largest stands of mangroves (*Avicennia marina* and *Rhizophora mucronata*) in Saudi Arabia, and are considered representative of the central Red Sea. The Outer Farasan Bank and islands have a different biophysical and geomorphological character to the northern Red Sea and Gulf of Aqaba. The area contains species which are more suited to more turbid sediment-loaded waters which occur here because of terrigenous input and water mixing across the wide shallow coastal shelf. The highest sea temperatures are found in this zone and coral development is restricted.

The Farasan Islands and surrounding waters and reefs were designated as a major protected area by the Saudi Arabian government in 1996. Human exploitation until recently has been minimal due to the small populations resident on the islands, although this is increasing now due to commercial fishing, recreational spearfishing, and urban and industrial development. Nominating this site will require an integrated approach among stakeholders, but such an approach will be difficult due to the strongly sectoral organization of the government. Recent efforts in creating advisory councils and a national coastal zone management plan may begin to address the problem, while environmental monitoring and enforcement of existing environmental regulations will also need to be improved. There are no NGOs operating in Saudi Arabia that would be able to address the issue of site nomination / long-term commitments for a WHS, but it is likely this will be addressed by the National Commission for Wildlife Conservation and Development (NCWCD), in consultation with the Meteorological and Environmental Protection Administration (MEPA).

The value of the Farasan Banks WHS would be greatly enhanced by extending the areas across the Red Sea to include the Dahlak archipelago in Eritrea, offering trans-border conservation opportunities while simultaneously expanding the capacity of the protectorate to with stand short-term impacts and provide a continuing source of larva to re-colonise other portions of the central and southern Red Sea.

8. Sanganeb Atoll, Sudan

One of the most unique reef structures in the Sudanese Red Sea is Sanganeb atoll (19°45'N; 37°26'E), whose steep slopes rise from a sea-floor of more than 800 m. This is the only true atoll anywhere in the seas of Arabia. Previous studies along these reefs suggested they are among the most diverse and spectacular in the Red Sea. This is the only marine protected area in Sudan, established in 1990. It is an 12 sq. km atoll with highly diverse and complex coral reefs, diverse reef-associated fauna, sharks, marine mammals and manta rays, and is the only typical atoll in the Red Sea. Sanganeb was proposed as a WHS back in 1994 but was not nominated due to lack

of baseline information. Several studies have taken place on the atoll since that time, and detailed information is available on the biodiversity of the atoll.

The most severe threats to reefs come from maritime shipping and dredging, and there are reports of illegal fishing, and collection of invertebrates (beche de mer and *Trochus*) which is almost certainly unsustainable. The tourism sector contributes to damage of reefs by anchor and flipper damage. An additional problem is that of the shark fishery by foreign vessels. Other than this fishery, neither commercial nor artisanal landings reach the estimated maximum sustainable yields, and further fishery development at present is negligible. Sudan has much of the infrastructure needed for regular monitoring and effective management of coral reef resources, but many of the present problems with coral reef conservation are attributed to a lack of law enforcement, a lack of awareness, a weak legal framework, and the absence of surveillance.

Sudan has much of the infrastructure needed for regular monitoring and effective management of marine resources. There exist a number of research organisations that have carried out research on reefs in the past, and government agencies (such as the Navy) which provide a limited degree of enforcement. Although Sudan has ratified a number of international Conventions and Protocols which are relevant to the protection of the environment in general, only the regional Jeddah Convention for the Conservation of the Red Sea and Gulf of Aden Environment is concerned with the marine environment. The national legal framework for the protection of the environment in the Sudan is weak; a new framework umbrella law for the environment has been submitted to the Ministry of Justice but is not yet enacted and there is no comprehensive maritime law. Several legislative decisions are needed at both national and international levels. These would strengthen Sudan's legal framework benefiting marine protected areas. The Sudan Marine Conservation Committee (SMCC) is an institution with representatives from all government institutions, the private sector, and NGOs concerned with the Red Sea environment. It played an important role in raising awareness and in formulating regulations, particularly in the 1970s, and could possibly play a similar role with the nomination of Sanganeb as a WHS. Similarly, the Red Sea University at Port Sudan has two sub-units which are active in marine research and education: The Faculty of Marine Sciences and Fisheries, which trains undergraduate students in marine and fisheries sciences, and the Marine Research Institute, which is being established to revive the research activities of the former Institute of Oceanography. NGOs include the Sudanese Environment Conservation Society which has branches at Port Sudan and Suakin, the Sea Friends Association at Port Sudan, and OXFAM U.K./Ireland with offices in Port Sudan and Tokar.

Sanganeb's greatest claim to fame is its spectacular setting, and its prominence as the only true atoll in the Red Sea. The deep waters off the reefs provide sheer drop-offs and clear waters enable growth and diversity to exist to greater depths than at other locations in the region. Although small, the atoll contributes biologically as a larvae producer, re-stocking reefs throughout the central and southern Red Sea.

9. Murawah Island – Bu Tini Shoals, United Arab Emirates

The Murawah and Bu Tini islands lie approximately 150 km to the west of Abu Dhabi, United Arab Emirates (24°13'N; 53°14'E to 24°28'N; 53°04'E). Murawah is approximately 10 km in length by two km wide, and is located among the rich and extensive sea grass beds of the waters of the United Arab Emirates, which forms an important habitat for dugongs in the Gulf and probably includes the majority of this population. The dugong mostly inhabit the shallow waters around these islands, but their range also extends further west to the border of Qatar. There are also occasional sightings to the east around Jebel Ali, Umm-Al-Quwain and Ras al Khaimah. Other cetaceans include the bottlenose dolphin (*Tursiops truncatus*), the common dolphin (*Delphinus delphis*) and finless porpoises (*Neophocaena phocaenoides*). The area around the islands also supports feeding populations of green turtles, and nesting populations of hawksbills. The seagrasses are also important nursery areas for commercial fishes and provide habitats for hundreds of other marine species.

Given that the dugong is a species which is critically endangered, its conservation should be considered as a global priority, and the UAE has been identified as a country which could realistically play a part in its conservation. However, in the UAE there is a lack of legislation relevant to protected areas. Individual sites are only established under private initiative of the ruling families or under hunting legislation. The main administrative and management body for the protection of the environment is the Federal Environmental Agency (FEA), while the Ministry of Agriculture has jurisdiction over matters concerning the conservation of nature and the environment. This Ministry is obliged to manage and protect the various hunting areas, bird sanctuaries and turtle beaches. Other main state bodies with interests in protected areas are the Permanent Committee for Conservation and Ecology at the Presidential Court of Abu Dhabi and the Higher Environmental Committee (HEC) of the Ministry of Health. The HEC is concerned with aquatic life in coastal and marine areas and the impact of water pollution, as well as environmental threats posed by oil and gas development.

10. Belhaf – Bir Ali, Yemen

This is a coastal stretch and group of high aspect islands with extensive fringing coral reefs and rich fishing areas (14°00'N; 48°10'E). The area is also an important seabird and marine turtle nesting site, and contains a globally unique salt water crater with fringing mangroves. The area around Belhaf is volcanic with extensive lava fields leading to the coast in places. These conditions have resulted in the growth of extensive high-cover coral communities dominated by *Porites* colonies and occasional large *Acropora* tables, staghorn beds and foliose *Montipora* stands. The Bir Ali area supports the most concentrated distribution of coral communities known from the northern Gulf of Aden, with large coral patches developed offshore from the village and coral communities fringing the offshore islands. Community structure at individual sites varies from large monospecific stands of pocilloporids, faviids and poritids to moderately diverse assemblages (ca. 50 spp. Scleractinia). The fish communities associated with these corals are the most diverse so far identified in Arabia. Coral and fish communities on the islands offshore from Bir Ali are particularly well developed, share interesting biogeographic affinities and may be important in maintaining gene flow along the Gulf of Aden coast. The coral fauna in the crater region forms a veneer over steeply sloping volcanic rocks and boulders down to 8 m depth where a gently sloping sandy bottom prevents further colonisation. A total of 32 genera have been reported for the nearby Aden area. These sites have high regional significance, as communities with high coral cover (whether forming true reefs or not) are known to occur only very rarely in the Arabian Sea. Coral communities of the north-east Gulf of Aden are notable for the occasional co-occurrence of large monospecific coral stands immediately adjacent to diverse coral assemblages, developed in similar environmental conditions: depth, light, sea temperature, sediment type.

Marine habitats not ranked highly on the protection agenda in Yemen. Development of urban centers and industry carry a higher priority, and only in recent years has the protection of marine habitats been addressed. A fledgling tourism industry poses a potential threat to reefs in the form of anchor and diver damage. Coastal development, the petroleum industry and maritime shipping, on the other hand, pose a significant risk to reefs in the form of untreated sewage, land filling, and hydrocarbon pollution, among others. A major oil loading terminal is currently being developed at Belhaf, at the western edge of this exceptionally important area. It is hoped that impacts from this development on the marine communities of the area will be low. This area is currently included within a GEF Coastal Zone Management Pilot Project for the northern Gulf of Aden region.

A number of governmental agencies have responsibility for the coastal and marine areas, as there is no authority solely in charge of the management of the coastal zone in Yemen. These include the Environment Protection Council (EPC), the Ministry of Fish Wealth (MFW), the Public Corporation for Maritime Affairs (PCMA), the Maritime Training Centre, and the General Tourism Authority (GTA). One of the major gaps in the process of marine area conservation is the lack of funding to establish and implement regulations in marine protected areas. These will also need strict enforcement, and further research to acquire baseline information. There is also a general lack of funding for marine research activities, and most research is currently funded through GEF, World Bank or UNDP projects. Yemen will need to monitor the implementation of legislation concerning these areas with regard to coastal development, fisheries and tourism.

11. Socotra Archipelago, Yemen

The Socotra archipelago is situated off the east of the Horn of Africa, at the south-eastern end of the Gulf of Aden (approx. 12°N; 54°E). The archipelago occupies some 362,500 sq. km and is home to diverse terrestrial plant and animal life with a high degree of endemism. Socotra is the main island, the others being Abd al-Khuri, Samha and Darsa, and the small rock islets Kal-faraon and Sabouniya. The marine biogeography of the islands is of great importance, as the area is home to a major change in coastal faunal assemblages, from a characteristically western Indian Ocean fauna to one which is basically Arabian, and also because the seasonal cold water upwellings which give rise to a 'pseudo-high latitude effect' characterised by raised productivity and lower temperatures. The archipelago is now renowned for its highly diverse coral reef which are of great biogeographic significance, and their associated fish fauna represent an important link between reef communities on the western Indian Ocean and those of the Arabian region. The reef communities resemble those of Oman, more than 500 km to the north but appears to be more diverse. The archipelago supports a diverse fauna of ca. 240 stony coral species, placing it among the richest sites in the western Indian Ocean. The outer islands (Abd Al Khuri, Samha, Dahsa and Kal Farun) are on average more diverse than Socotra for both corals and fish. As with the other parts of the Gulf of Aden, some corals attained great size and are centuries old. The northern and southern shores of the islands support very different marine communities, due to different exposures to the upwelling. This is a rather unique physical feature, which adds to the overall diversity of the archipelago.

The Socotra archipelago has long been isolated from the mainland, surrounded by deep waters, in places exceeding 3,000 m depth. It lies 400 km south of the Arabian peninsula and is highly exposed to the monsoon climate of the Indian Ocean. Annual rainfall is around 200 mm, mainly falling in June, November and December. Average air temperature ranges from 17 °C in January to 37 °C in July. Most of the coast consists of cliffs or sandy beaches with occasional gravel shorelines. Corals are widespread throughout the archipelago, with cover varying from less than 5 % to 80 %. Coral communities of the Socotra archipelago are notable for the occasional co-occurrence of large monospecific coral stands immediately adjacent to diverse coral assemblages, developed in similar environmental conditions: depth, light, sea temperature, sediment type.

Most of the coastal and marine areas surrounding these islands are still in a pristine state and in 1996, the Government of Yemen declared Socotra a special natural area in need of protection. The islands have international importance as a coral reef monitoring centre, as such sites are becoming rare in many coral reef-bearing countries, where human impacts are causing loss of valued reef attributes. The islands are presently undergoing rapid development and are receiving increasing national and international attention as a tourism destination and as an export source of fish and coral. Thus the recent proclamation of a large multiple-use marine protected area around the Socotra archipelago by the Government of Yemen is both timely and well conceived.

EXISTING WORLD HERITAGE SITES IN THE REGION AND THEIR POTENTIAL FOR EXPANSION AS CLUSTER AND OR TRANS-BORDER SITES

There is only one existing World heritage site in the region which could be expanded to include the coastal zone and an offshore island, the Arabian Oryx Reserve in Oman, which borders the proposed Masirah Island / Barr Al Hickman site. The Arabian Oryx Sanctuary is an area in the biogeographical province of Arabian Desert. It is one of the largest protected areas in the region and includes the only free-ranging herd of Arabian Oryx in the world. This region is noted for its viable population of Arabian Gazelle as well as being a habitat for several species, such as the endangered Houbara Bustard, as a part of its diverse avifauna. Here it would be possible to extend the site to include both terrestrial and marine components, although the objective / value of the reserve might be diluted by such a broad coverage.

At present PERSGA intends to link up its set of proposed MPAs into a regional complex, and has identified these sites based on their regional as well as national biological values. For this reason, the protection of, say, the Sept Frères islands in Djibouti, the Bab al Mandab at the mouth of the Red Sea, the Belhaf - Bir Ali area in Yemen and the Farasan archipelago further north in Saudi Arabia all could make up a complex, multi trans-border complex, all interlinked by their unique marine biotic composition.

Another potential area for trans-border macro-site nominations are the Farasan Islands in Saudi Arabia extending to the Farasan Great Banks in Yemen in the southeastern quadrant of the Red Sea and across to the Dahlak archipelago in Eritrea in the southwestern quadrant of the Red Sea, possibly down to the Bab Al-Mandab and include the Sept Frères islands in Djibouti.

In the northern Red Sea, the entire Gulf of Aqaba, including the Egyptian, Jordanian, Israeli and Saudi Arabian coasts and extending out to the Straits of Tiran and inclusive of the islands would make another suitable trans-border site, with the possible major exception of the conflicts between Israel and other Arab States. This is a relatively pristine area of great ecological, biogeographic, evolutionary and scientific value which would include Ras Mohammed (among the only long-term Marine Parks established in the Red Sea) and could extend to include St. Catherine's, which has great religious history and importance.

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INFORMATION MATRIX FOR POTENTIAL TROPICAL COASTAL, MARINE AND SMALL ISLAND WORLD HERITAGE SITES IN THE MIDDLE EAST REGION

Name of site, Country	General Physical description of site	Marine Biodiversity Value	Conservation Management	Management constraints and environmental threats	Environmental Monitoring	Association with NGO's
1 <i>Sept Frères Islands / Ras Siyan and the Bab al Mandab, Djibout - Yemen</i>	A group of high aspect, rocky islands and an adjacent coastal stretch with a mangrove-fringed bay, containing diverse coral reefs and rich reef-associated fish and invertebrate fauna.	Unusual and regionally exceptionally diverse marine communities. These include a shark nursery inside Ras Siyyan Bay on the Djibouti side, and some exceptional coral, mangrove and seagrass areas on the Yemen side.	At present no Protected Area status. Nominated by PERSGA as one of its key regional MPAs within its Strategic Action Plan. No current management projects.	Nomination and designation as a WHS would be hampered by funding constraints, and would need an international accord with Yemen. Threats from recreational activities, fishing, and oil pollution / siltation caused by passing vessels.	Carried out by the Ministry of Agriculture; the Directorate of Maritime Affairs (Ministry of Transport and Telecommunications); the National Office for Tourism, Arts and Crafts; the Institute of Higher Studies, Scientific and Technical Research; the Service for Management and Environment, the Inter-ministerial Co-ordination Commission on the Protection of the Marine Fauna of the Seabed and the National Council of the Sea.	PERSGA, others unknown at present
2 <i>Gabal Elba Conservation Area, Egypt</i>	Encompasses some 30,000 sq. km of the Doaib, Gebel Elba and Abraq regions. Terrestrial part contains mountains and gently sloping plains, marine component comprises 22 offshore islands of the Siyal and Rawabel groups.	Extensive fringing reefs, mangroves, seagrass, fish and marine mammals.	Currently being addressed through GEF-Egypt and USAID projects, and is one of the key regional MPAs that PERSGA has nominated within its Strategic Action Plan.	Continuing conflicts between the Egyptian and Sudanese governments regarding the exact international border delineation, oil spills, land reclamation and sedimentation are responsible for a large extent of damage. Recreational SCUBA diving practices including anchor damage also considered significant.	Tourism Development Agency, the Egyptian Environmental Affairs Agency (responsible for monitoring pollution and damage of coastal environments) and the three Red Sea Governorates. The National Institute of Oceanography and Fisheries (NIOF), Al-Azhar University, and Suez Canal University carry out research and monitoring of coral reef habitats.	PERSGA, others unknown at present

3 <i>Haraa Protected Area, Iran</i>	Lying in the straits of Khuran, between Qeshm Island and the southern Iranian coast. Includes the Mehran delta with extensive intertidal flats, marshy coastline and vast mangrove formation with numerous small islands, creeks and minor estuaries.	The largest stand of <i>Avicennia marina</i> mangroves along the Gulf shoreline, of major importance to breeding, wintering and migrant and breeding water birds; fish (32 species from 17 families); marine turtles; five species of marine snakes; foxes, jackals and hyenas, and the rare finless porpoise, among others.	Management activities are still poor even though a simple zoning plan was prepared recently. 100,000 ha designated as a Ramsar site in 1975, the Reserve (85686 ha) designated as a Biosphere Reserve in 1976.	Illegal cutting and logging of mangroves for fuel (charcoal) and grazing by domestic livestock; fishing and boat traffic; funding; oil pollution.	Department of Environment, Iranian Fisheries Research Institute, Iranian Center for Oceanography.	There are several Iranian biodiversity-oriented NGO:
4 <i>Masirah Island and Barr Al Hickman, Oman</i>	Masirah is a 70 km \times 4-10 km rocky island 8 km from the SE coast of Oman. Between Masirah Island and Barr Al Hickman on the mainland there is a shallow sandy channel 80 km long and 10 m deep supporting seagrasses, the main food for green turtles.	Supports the largest loggerhead turtle nesting grounds in the world ($> 30,000$ / year). The channel is an important feeding ground for the green turtle; 22 species of whales and dolphins (with possibly two species new to science, making the area important with regard to cetacean diversity),	Currently being considered for protection under the Man and the Biosphere initiative. Oman has a national biodiversity strategy, and strict laws now exist for wild life protection. The Coastguard enforces regulations on licensing of fishermen and boats, on dive permits and on prohibited or restricted access to certain areas. There are no specific management plans in place for the Masirah island – Barr Al Hickman area.	There are land-based fisheries observers employed by the Ministry of Agriculture and Fisheries, but no fisheries enforcement vessels. There are currently no environmental enforcement officers in the marine zone, though it is intended that these will be provided by the Ministry of Regional Municipalities and Environment Constraints include lack of funding and local stakeholder involvement.	Carried out by the Ministry of Regional Municipalities and Environment, research also carried out by Sultan Qaboos University.	ROPME, Oman Natural History Museum, the Oman Whale and Dolphin Research Group

5 Ras Al Hadd, Oman	The easternmost point of the Arabian peninsula. South of Ras Al Hadd the shoreline borders the Wahiba Sands desert, where sand dunes reach the coast.	Is one of the busiest nesting sites in the world, with up to 20,000 green turtles per annum, making it the most important green turtle rookery in the Indian Ocean. The spectacular cliffs are exceptional in aesthetic value.	Oman has a national biodiversity strategy, and strict laws now exist for wild life protection. The Coastguard enforces regulations on licensing of fishermen and boats, on dive permits and on prohibited or restricted access to certain areas.	There are land-based fisheries observers employed by the Ministry of Agriculture and Fisheries, but no fisheries enforcement vessels. There are currently no environmental enforcement officers in the marine zone, though it is intended that these will be provided by the Ministry of Regional Municipalities and Environment	Carried out by the Ministry of Regional Municipalities and Environment, research also carried out by Sultan Qaboos University.	ROPME, Oman Natural History Museum, the Oman Whale and Dolphin Research Group
6 Jubail Marine Wildlife Sanctuary, Saudi Arabia	The 22300 sq. km area encompasses extensive mudflats, mangroves, and a diverse array of benthic habitats including reefs and seagrasses. The area is an important avifaunal wintering site and migratory pathway, and the Gulf's most important turtle rookery.	Home to breeding populations of hundreds of thousands of terns (<i>Sterna</i> spp.) and the endangered Socotra cormorant. The offshore islands are home to the Gulf's largest nesting populations of marine turtles, and possibly the largest hawksbill rookery in the NWIO. Five species of whales, dolphins and porpoises have been identified in the Sanctuary.	The Jubail Marine Wildlife Sanctuary was established in 1994 following the 1991 Gulf war and is a <i>de facto</i> protected area awaiting Royal declaration.	Constraints will include lack of funding and local stakeholder involvement. Threats include turtle and bird egg poaching, landfilling and habitat loss.	Carried out by the National Commission for Wildlife Conservation and Development (NCWCD) which establishes and manages protected wildlife areas, including marine and terrestrial life; and the Meteorology and Environmental Protection Agency (MEPA), which develops criteria, standards, guidelines and policies to protect the environment and to control pollution).	None

7 Farasan Inner and Outer Banks (Archipelago), Saudi Arabia	The Inner Bank comprise a low-lying, seasonally inundated mainland coastline, fringing mangroves, islands, birds nesting and dugong area. The Farasan Outer Bank or Archipelago lies between 3 to 100 km offshore, and the proposed protected area encompasses 3310 sq. km, composed principally of uplifted coral reefs, and rich in coastal and marine resources.	A wide diversity of fishes, and marine turtles, dugong, and numerous resident and migratory bird species. There are also four species of cetaceans (the Indo-Pacific, Spinner and Bottlenose dolphins, and the Bryde's whale). Also support a wide variety of reef types, including 'tower' reefs and other marine and coastal habitats not present in other areas. Contain then largest stands of mangroves in Saudi Arabia.	Designated as a major protected area by the Saudi Arabian government in 1996. Currently operated under the Farasan Islands Management Plan developed by the National Commission for Wildlife Conservation and Development.	Threats include commercial fishing, recreational spearfishing, and urban and industrial development. Constraints include lack of funding, a strongly sectoral organisation of the government, and lack of shareholder participation in management.	Carried out by the National Commission for Wildlife Conservation and Development (NCWCD) which establishes and managed protected wildlife areas, including marine and terrestrial life; and the Meteorology and Environmental Protection Agency (MEPA), which develops criteria, standards, guidelines and policies to protect the environment and to control pollution).	None
8 Sanganeb Atoll, Sudan	The only true atoll in the seas of Arabia, whose reefs, which steep slopes rise from a sea-floor more than 800 m, are among the most diverse and spectacular in the Red Sea.	Highly diverse and complex coral reefs, diverse reef-associated fauna, sharks, marine mammals and manta rays.	The only MPA in Sudan. Proposed as a WHS in 1994 but not nominated due to lack of baseline information. Government agencies (such as the Navy) provide a limited degree of enforcement, but the national legal framework for environmental protection is weak. There are no management plans currently in use at Sanganeb.	Threats include maritime shipping and dredging, illegal fishing (particularly sharks) and collection of invertebrates (beche de mer and <i>Trochus</i>), anchor and flipper damage. Constraints include a lack of planning for marine protected areas, and a major lack of funding. Additionally, harmony among government institutions would need strengthening.	Carried out sporadically by the Faculty of Marine Science and Fisheries of the Red Sea University and the Suakin Marine Laboratory.	PERSGA, the Sudan Marine Conservation Committee.

9 <i>Murawah Island – Bu Tini Shoals, United Arab Emirates</i>	Lying about 150 km west of Abu Dhabi, Murawah (10 km _ 2 km) is among the rich and extensive sea grass beds of the United Arab Emirates.	The most important habitat for dugongs in the Gulf, second largest population in the world. Also supports sea turtles and various cetaceans.	There are currently no management plans in place for the site, although it has been singled out for marine protected area status by a number of studies.	There is a lack of legislation relevant to protected areas, and sites are only established under private initiative of the ruling families or under hunting legislation.	The main administrative and management body is the Federal Environmental Agency (FEA), while the Ministry of Agriculture has jurisdiction over matters concerning the conservation of nature and the environment.	None known at present.
10 <i>Belhaf – Bir Ali, Yemen</i>	A coastal stretch and group of high aspect islands with extensive fringing coral reefs and rich fishing areas.	An important seabird and marine turtle nesting site, containing a globally unique salt water crater with fringing mangroves. The area supports the most concentrated distribution of coral communities known from the northern Gulf of Aden. The fish communities are the most diverse so far identified in Arabia	The area is currently included within a GEF Coastal Zone Management Pilot Project for the northern Gulf of Aden.	Major threats include tourism, coastal development, the petroleum industry and fishing activities. There is also a general lack of funding for marine research and management activities	Only occasional studies carried out at the site. Nationally under the responsibility of the Environment Protection Council (EPC), the Ministry of Fish Wealth (MFW), the Public Corporation for Maritime Affairs (PCMA), the Maritime Training Centre, and the General Tourism Authority (GTA).	PERSGA, others unknown at present.
11 <i>Socotra Archipelago, Yemen</i>	Island group with outstanding terrestrial plant and animal endemism, diverse and largely pristine marine environments and biota.	Highly diverse coral reefs which are of great biogeographic significance, diverse terrestrial plant and animal life with a high degree of endemism.	In 1996, the Government of Yemen declared Socotra a special natural area. Socotra was also the site of a recent GEF/UNDP project.	Potential threats are fishery pressure, rapid development and plans for developing the port and tourism facilities. Constraints would include a lack of funding and the need to improve the livelihood of the residents in order for them to participate in conservation activities.	Under the responsibility of the Environment Protection Council (EPC), based on availability of funding.	PERSGA, Friends of Socotra